

DISEASES *of the* CHEST

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DISEASES

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C. M. HENDRICKS, EDITOR-IN-CHIEF

(A MONTHLY PUBLICATION)

"The most important factor in diagnosis in the majority of cases of pulmonary tuberculosis is keeping the disease in mind."

Lawrason Brown, M. D.

Editorial Comment

Tuberculosis and Quackery

PHYSICIANS ARE prone to be criticized by the laity for their slowness in taking up a new cure that is offered for almost any disease. It is well that the profession does not eagerly respond to every so-called sovereign remedy, for the disappointments that follow in their train are numerous; and the cases of many who have tried such remedies and in whom they have failed are heart-breaking and tragic. Tuberculosis is no exception to this rule. Both in the lay press and by word of mouth one hears of all sorts of schemes that are vaunted as being effective in securing recovery from this disease—the application of high degrees of heat, various lights (and, alas, some shadows), foods, drugs, one after another, are paraded before a credulous public and an equally incredulous medical profession.

The great trouble with all these specifics in tuberculosis lies in the fact that they disregard the tripod upon which experience in the management of the disease is based; namely, rest, fresh air and good food. To these three, which have withstood the test of time, must now be added the proper employment of pulmonary surgery in the wisely selected case. The three fundamentals above mentioned still stand unassailed by all who have a wide experience in the treatment of tuberculosis. Anything else other than pulmonary surgery must be considered in the nature of an adjunct by no means to take the place of the corner-stone of treatment.

Quackery and charlatanism thrive on advertising and the making of spurious claims to sick, frightened and anxious patients and relatives. The medical profession, standing firmly on the rock of knowledge and yet possessing the wisdom of the inquiring mind, refuses to be stamped by any unworthy assertions; and, therefore, must withhold its sanction to the employment of any new method until by unquestionable experiment and clinical data it has been found that the remedy is actually of worth. When this comes about (as witness the case of insulin), the medical profession is the first to welcome with open arms any addition to its therapeutic armamentarium.

P.H.R.

Depression Deaths

DURING THE depression we have been told through the daily press and current magazine articles that the health of the Nation had improved. However, this has been far from the truth. We are now reliably informed by the Asst. Secretary of the Treasury Roche, in charge of the United States Public Health Service, that a survey covering a period of 1929 to 1933 shows that the mortality in families of un-employed and part time workers increased 20%. The sickness rate for the same group had increased 50%.

Apart from the human suffering and injustice involved in these figures, the economic waste and financial loss to the Nation is incalculable. In former editorial comments it has been pointed out that at

no time in the past decade has tuberculosis assumed a more menacing aspect. Now comes the above official figures pointing out that the sickness rate in a special group has been increased 50%. Future surveys will undoubtedly reveal a large increase in the incidence of tuberculosis.

There are many well-fed citizens and members of congress who object to the proposed public health appropriation of eight million dollars in the President's Social Security bill which is being held up in the senate committee. We agree with Secretary Roche who commented "Probably the day will come when the Federal Government will invest in public health not eight million, but one hundred and twenty million or \$1.00 per person."

Spectacular disasters such as earthquakes, sea tragedies and war which bring sudden death, really shock the public, but the slow insidious horror of disaster which carries slow death for even larger numbers of victims is beyond average comprehension. It has taken us five years to discover the ravages of hunger and what is happening to the health of under-nourished and poorly-housed Americans. We will study with great interest the next official report from the United States Public Health Service. C.M.H.

Mental Attitude GREAT CATASTROPHIES are known to have a marked influence on the incidence of disease. War, pestilence, famine and financial depressions, leave their deleterious effects on the physical body as well as the body politic.

The financial condition of the present period has made itself felt by every tuberculous individual as well as those who are especially interested in the control and treatment of the disease.

The lowered standards of living have contributed to bodily weakness and physical disturbance. Mental conflict, anxiety, and neurasthenic states add greatly to the lowering of resistance upon which prophylaxis and treatment of tuberculosis so depend.

It is reasonable to anticipate that the psychic and somatic depression brought about by the untoward financial state of the past few years, will result in a large increase in the incidence of tuberculosis and will serve to aggravate open cases and tend to open closed cases, who were doing well under less adverse circumstances.

Mental attitude is a salient principal in the treatment of any disease, especially in the treatment of tuberculosis. Anxiety over finance, social relations, home disruption and gloomy future prospects, all contribute to the disturbance of metabolism, interfere with rest and contribute to somatic and autonomic nerve dysfunction. To meet these conditions, to study and analyze them, will be added problems for those of us who are interested in the control and treatment of pulmonary tuberculosis. C. M. H.

Time as a Factor in Tuberculosis FREQUENTLY we are confronted with the statement from patients who are beginning the fight against tuberculosis that they have been assured by some physician that they could overcome the trouble in a few weeks. This is a rather dangerous assurance to give, since it often encourages the patient to undertake to carry out a regime which imposes a financial obligation that he can assume for a short time, but could not continue over a long period. Then, too, when he discovers, as in time he must, that to reach his goal will require more time than he anticipated, his confidence in the ability or veracity of his physician is shaken.

There are several factors which are responsible for the time required in the treatment of tuberculosis. In the first place the disease has been present and making pathological changes in the lung tissue, in most instances, for a much longer period of time than we think. In other words, the disease has already become chronic before the patient consults his physician. Tuberculosis is often very insidious in its onset, and in most cases care-

ful questioning will reveal the fact that the patient has not really felt well for two or three years prior to his first visit to the doctor.

The toxemia has already affected other vital parts of the body, and, necessarily, much time will be required for building up the resistive forces sufficiently to repair the damage already done. The tubercle bacillus is very resistant because of its protective waxy capsule and its manner of growth in the tissues. No remedial agent has yet been found which will quickly destroy the organism in situ, therefore we must depend upon methods of treatment, the results of which come slowly.

Then, too, we should not forget that the matter of individual resistance to tuberculosis has a very wide range of variation. One cannot estimate with any degree of accuracy the amount of natural resistance which may be possessed by any individual, therefore, one who apparently has but a small lesion when the diagnosis is made may, because of an individual low resistance, require several years to secure an arrestment of the disease.

Necessarily, the element of time is influenced by the attitude which the patient assumes when the nature of his trouble is made known to him, the zeal and earnestness with which he tackles the job, and the degree to which he co-operates with those who are directing the fight.

At least we may suggest that the physician should think very carefully before venturing an opinion as to how long it will take the patient to get well. R. B. H.

Tuberculosis Among Infants IT HAS long been an accepted fact that advanced tuberculosis, milary, meningeal, or pulmonary, among infants, has, with few exceptions, a fatal termination; hence the idea has also arisen in the minds of many that the infant's resistance to tuberculous infection is practically nil. Within recent years, however, with the more routine use of tuberculin skin tests and with more frequent X-ray examinations of the chest, opportunities have been provided to study

the infection and disease among infants in its early stages. The results of such studies indicate that many infants develop a high resistance to their infection, and that not a few recover from the more chronic, and some even from the advanced forms of the disease.

Spontaneous Pneumothorax SPONTANEOUS PNEUMOTHORAX has been divided into two groups:

- (1) A group including the typical cases of chronic pneumothorax, hydro-pneumothorax and pyo-pneumothorax in tuberculous patients, mostly of a bad prognosis.
- (2) A group including most of the cases of so-called "idiopathic" pneumothorax in apparently healthy persons, arising spontaneously and in connection with some—often very slight—muscular effort, such as lifting a weight, swinging a golf club, running, laughing, coughing or sneezing.

The abnormal physical signs generally disappear within four or five weeks without special treatment. It is believed that the most probable explanation of these cases, is that at some time or other a slight tuberculous bacillaemia (perhaps regarded at the time as an attack of influenza or "febrile pulmonary catarrh"), resulted in the formation of a certain number of sub-pleural tubercles. One of these tubercles led to a local pleural adhesion, and afterward to a superficial emphysemabulla, adherent to the parietal pleura; as time went on the wall of the bulla gradually became thinner, and finally ruptured spontaneously, thus leading to the occurrence of "idiopathic pneumothorax" in an apparently healthy person.

In group 1 it is not to be expected that a spontaneous pneumothorax would be of much benefit to an individual.

In group 2 it should be remembered that the spontaneous pneumothorax hardly ever leads to more than a temporary inconvenience and as the patient is usually otherwise in good health, there could possibly be no good resulting in a spontaneous pneumothorax. C. M. H.

Supervised Graduated Exercise in the Treatment of Pulmonary Tuberculosis

EXERCISE HAS no place in the treatment of a patient suffering from an active tuberculous lesion regardless of its location. Rest, absolute rest, the nearest approach to immobilization, is the only part of the program that has stood the test down to this day. Every improved method is based on the idea of rest. Pneumothorax, removing the phrenic nerve, thoracoplasty are all based on rest. There is probably no disagreement here among those who know most about this disease and its treatment.

The purpose of complete rest is to heal the patient's disease—not to maintain or promote his physical capacity and ability. Exercise during the active stages of tuberculosis has probably killed millions. It is equally consistent to say that rest has never hurt a patient's lesion.

But after the disease is healed, supervised, graduated exercise is the only safe way to restore the patient's capacity and fit him for the duties and demands of a normal active life.

The beginning of exercise may be considered and is the danger period in the treatment of tuberculosis. This is when recurrence, at times uncontrollable, usually happens. No tuberculous patient can stay in bed six months, a year or longer and be safely ready for a day's work when he leaves the bed. To try it would be disastrous. If a patient can not afford sanatorium supervision during both the rest and the exercise periods, it would be infinitely safer to forego supervision during the bed rest period and have it for the exercise program. If he gets hurt anywhere along the line, it will be most likely after his rest is finished and his exercise begins. This is why those who treat tuberculosis fear recurrence. The patient is fat, he looks well, he is symptom free—clinically well. For further supervision, he sees no need and has no desire; and here tragedies usually enter.

BY
S. E. THOMPSON, M.D.
Kerrville, Texas

But you say why do we not teach the vital importance of all this? We do. Just remember our first forefathers ate the forbidden fruit and that when God Almighty, Himself was their teacher.

It therefore follows that the only safe course for him who has an apparently healed lesion is supervised, graduated exercise directed by a physician experienced in this kind of work. The safe and beneficial dose of exercise must be understood. A dose too small is worthless. An overdose may prove disastrous. The results on both the patient and his lesion must be closely watched and accurately assessed.

As a rule, the first and safest exercise, when the patient's condition permits, is reading. He may begin with thirty minutes in the morning. If this does no harm and produces no symptoms, thirty minutes in the late afternoon may be permitted. These morning and evening periods may be increased every few days as conditions warrant. Limited writing may now be permissible. After the patient is reading two or two and a half hours each day, he may sit up in his room for his breakfast—usually for an hour. After a satisfactory week of this, he may sit up an hour for the evening meal and in a few days the noon meal. After this, the morning time may be increased thirty minutes each week until the patient is up from after breakfast to ten o'clock and from five until eight-thirty p. m.

It should now be safe to try some other form of exercise—preferably walking fifteen minutes morning and late afternoon. This may be increased each week at the same ratio. The pulse and temperature should be taken immediately after exercise and again in thirty minutes. If any fever or high pulse registered immediately after exercise disappears in thirty minutes, it may be considered negligible. Gen-

(Continued to page 21)

How Not to Treat Tuberculosis*

THE SUBJECT assigned to me is: Some remarks on how *not* to treat pulmonary tuberculosis.

BY
EDWIN S. BENNETT, M.D.
Los Angeles, California

Had Dr. Howson been able to be on the program as was originally intended, his statements might have been considered as official and as representing the opinion of the Tuberculosis Service of which he is the Chief. I, being simply a member of the Attending Staff, free, white and considerably over twice twenty-one, am simply stating my personal opinions and observations of some twenty years of more or less close contact with tuberculosis at Bellevue, The Metropolitan Life Insurance Company, army tuberculosis hospitals, private practice and this institution.

In attempting to generalize when speaking of the care and management, or mismanagement, of tuberculous patients, when individualization is a prime factor in their care, I realize I am laying myself open to criticism, at the very start. I also realize that some of the methods or practices I am going to object to, are correct and proper in certain specific instances, and in certain selected cases, but I consider them to be the exception that proves the rule.

The first problem in how not to treat pulmonary tuberculosis is naturally a question of diagnosis. It is true the diagnosis is often not easy except in far advanced cases, and in these we all have missed, and will continue to miss, large cavities. However, there is no excuse for such a large percentage of cases being far advanced with little or no chance of recovery before they are diagnosed or seen by men doing chest work, both in private practice and in hospitals. Many doctors apparently take the attitude that once they are through medical school and internship, the taking of a careful history

is a waste of time. Others think because they found the lungs negative, or nearly so, on their physical ex-

amination, that the patient cannot have pulmonary tuberculosis even though the history may be suggestive. Few physicians, other than those primarily interested in chest work, have a patient exhale and cough during auscultation, and yet the examining physician who does not have the patient do this, does not know how to examine a chest for tuberculosis. The fact that one or two sputum examinations are negative for acid fast organisms does not rule out tuberculosis. A borderline or even a negative X-ray film does not mean that there may not be a clinical or active pulmonary tuberculosis. On the other hand, dullness to percussion or rales on auscultation over some portion of the lung does not justify a diagnosis of tuberculosis, without further study. The same is true of blood-streaked sputum, or even frank hemoptysis, or certain suggestive shadows in an X-ray film. Other than a positive sputum there is no short or easy road to a diagnosis of pulmonary tuberculosis. On the part of the general medical man there is a woeful lack of early and accurate diagnosis of pulmonary conditions. It is only natural that the chest man holds in rather low esteem the ability of his confreres to accurately diagnose pulmonary tuberculosis, at the stage when a cure may be expected. In a large percentage of cases, months or years later, we see their mistakes which they never know about. I realize that our batting average is equally low as regards surgery, gynecology, dermatology, cardiology or gastro-enterology, but we do not attempt to pass judgment on those cases.

When it comes to treatment there is little doubt but that patients are best handled in a sanatorium. This is particularly true of indigents or inmates of charitable or welfare institutions. In such places the doctors are not bothered by nor

*Read before the medical staff of the Los Angeles General (County) Hospital, Feb. 25, 1935.

swayed by the glib, silver-tongued orators who represent the big drug and supply houses, and whose "electrical transcription" is almost perfect, and whose knowledge of medicine and therapeutics is astounding. The professional call on the patient does not have to be justified by ordering a dose of this, or the giving of an injection of this or that vaccine, serum, antigen or stimulant, or the prescribing of a certain number of minutes exposure to this or that ray. The private patient cared for at home so often takes the attitude that because he is paying the doctor for his visit he has the right to demand certain treatments or medication, or of deciding that the treatment, suggested and advised by the physician, is not best for him. It is all too true that often the care and treatment of patients becomes a racket for the enrichment of the doctor and the pharmaceutical house. The excuse given is that the patient must be seen regularly and kept under control, and in order to justify the call in the eyes of the patient, something must be done and given, other than intelligent examination, careful management, honest and sound advice and hope and confidence. Such an attitude is an insult to the intelligence of a patient who has been properly instructed and advised about pulmonary tuberculosis, and reflects back on the doctor's ability to so instruct and advise. Just recently I met a physician who told me it had been necessary for him to take over the practice of a friend for a few weeks. I am acquainted with the doctor who was going away. He is not on the staff of this hospital but is perfectly eligible to be by virtue of his experience, training and professional standing. Just before leaving he saw a new patient and made a diagnosis of pulmonary tuberculosis. He instructed the doctor taking over his practice to see this patient every day for two weeks, and to give his daily injections of some gland hormone which would extract the calcium from his bones and increase his blood calcium. My reaction to this statement was a remark that sounded biblical, but was not so intended. In a

somewhat surprised tone the doctor said: "Why, isn't that treatment worth anything?" My answer was, "Yes, worth five dollars a day for fourteen days to your doctor friend." A specific instance such as this sounds rather crude and close to chicanery, but you know and I know that this physician was only doing what countless others are doing and in their own hearts they know they are not justified in so doing. However, we as individuals have little use and less respect for these hypo-shooting doctors, and we know that in the majority of instances the injection of this or that substance, drug or serum, in cases of active pulmonary tuberculosis is not indicated; is apt to be harmful, and not infrequently is just plain mercenary and dishonest.

We are continually hearing of new cures for tuberculosis varying from electric wave lengths, or heat units, to curative inhalations; chemical combinations of drugs or extracts that kill the tubercle bacillus by dissolving the fatty capsule, and therapeutic rays of one kind and another. For the first, suffice to say it smacks of the Abrams Treatment. Regarding the vaporium and inhalation idea it is quite true that the inhalation of certain medicated vapors tends to soothe the inflamed surfaces in sinusitis, tracheitis and bronchitis, and lessens cough and gives some relief. Codein is an indispensable drug in pulmonary conditions, but I have never heard it called a cure for tuberculosis even though it lessens cough and gives considerable relief. Various chemicals, drugs or extracts may dissolve the fatty capsule of the tubercle bacillus in a test tube and may do so in the lung, but if such is the case you may be sure it will also cause a lysis of the protective tissue nature is trying to build up around the infected area. Recently I saw a patient whose hemorrhage was caused, I believe, by just such destruction. As to infra-red and ultra-violet rays from therapeutic lamps and actual sun baths, I believe, in active pulmonary tuberculosis, such treatments do more harm than good and are

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Tuberculosis: Its Present Status

WE DO NOT DIE from tuberculosis, but rather from an ignorance of it. This proverbial saying embodies an intense truth; but even more striking is its corollary, that in education we have a powerful weapon with which to fight this disease. The object of this article is that the reader will receive some enlightenment with which to do his part in carrying on the battle against the Great White Plague. While much has been accomplished, the death rate at the present time reduced, the scourge still remains among us and leaves much to be done. The remote effects of the recent depression remain to be seen; but a rise in the morbidity curve may most likely be predicted. We know and hear a great deal concerning cancer and the mere mention of this dreaded malady fills the soul with terror; but as a menace to our social and economic welfare, its ravages fall far short of those due to tuberculosis. Tuberculosis strikes in the most fruitful and productive period of our lives, most deaths occurring between the ages of 20 and 40. The sufferers are victims of a long wasting disease which, in most cases, leaves them dependent upon relatives, friends or institutions of charity. Cancer, on the other hand, reaps its grim harvest in later life or in the so-called cancer-age which is 40 and beyond. Its victims have, as a rule, passed through the prime of life, suffer a disease of a shorter duration and are therefore more seldom left dependent on others.

More has been written and more research work done on tuberculosis than any other disease or possibly as much as on all other diseases combined. It has been known since antiquity, excellent descriptions having been handed down from the ancients, Galen and Hippocrates. The causative organism, the tubercle bacillus, was discovered over 50 years ago and its infectious nature proved years before that. The disease is widely disseminated in the

BY
CHAMPNEYS H. HOLMES, M.D.
Atlanta, Georgia

animal kingdom, even occurring in reptiles and toads. It may affect any organ in the body, but shows a particular predilection for the lungs. Today, a veritable army of workers in the research laboratories and clinics over the world are constantly striving to further our knowledge of this disease. Much is coming to light from the study of the bio-chemistry of the tubercle bacillus and its products.

From time to time one reads and continues to read in the lay press, fraudulent claims for a cure of tuberculosis. Before yielding to these tempting and enticing promises of cure, investigate their authenticity, the cradle of their birth. The long sought-for specific or cure has not been forthcoming. Much, however, has been accomplished and it is startling to realize that of all the chronic diseases producing death, tuberculosis is the most curable. This, however, implies early diagnosis and proper treatment.

Accomplishments in this field of work have been secured along the following lines: improved methods for early diagnosis; improved methods of treatment with special emphasis upon the development of surgical and mechanical procedures; observance of helpful health laws; improved sanitation in the home, school, office and factory; elevation of general living conditions, appreciating the value of rest, fresh air, wholesome food, outdoor exercise and avoidance of strain; periodic physical examination; and finally, the education and co-operation of both doctors and public. While we are striving to acquire further knowledge, our chief concern at the present time is the disseminating of that knowledge which we already possess. Captained by the guiding leadership of the National Tuberculosis Association, a vast organization has been formed throughout the country. A large corps of doctors, nurses, health and social workers, are daily working in dis-

pensaries, clinics, hospitals, factories, schools and homes, making examinations, treating those afflicted, and teaching the gospel of prevention. Supplementing these efforts are numerous lectures, pamphlets, circulars and posters, sponsored by the National Tuberculosis Association. Out of this extensive program there is gradually evolving and emerging a formidable array of resistance to the incursion of this disease, and the more hopeful of us see in the future an eventual eradication of this plague.

Doctors and nurses are being better trained in tuberculosis, adopting improved methods of diagnosis and treatment and learning better to evaluate the significance of certain signs and symptoms. No longer is the spitting of blood-stained or blood-streaked sputum casually dismissed with the explanation that it comes from a blood vessel in the throat. It is now realized that over 90% of all instances of obscure blood spitting is due to tuberculosis. They have learned that most cases of pleurisy, particularly the wet variety, are caused by a tuberculous infection and that unless these patients are properly cared for, subsequent mischief will develop in the lungs. The merits of the three fundamental principles in treatment are becoming universally appreciated and established. They are: first, and by far the most important, rest, and this should be both mental and physical; second, fresh air; and third, good wholesome food. Exercising to build up the strength, and stuffing with raw eggs and milk have been shown to be unwise and that they often invite disaster. The most effective measure for reducing the fever, checking the cough, and building up the strength is now no longer questioned; it is absolute bed rest. The importance of periodic examinations of all members of a family where a case of tuberculosis has occurred, as well as those individuals who have been closely associated, particularly in childhood, with such a case, is being more and more appreciated. Childhood infection and early diagnosis have probably received the greatest emphasis in the past few

years. Gross examination and case finding by means of the Mantoux or intracutaneous tuberculin test, using the recently developed P.P.D. tuberculin, has played a prominent part in this work.

The layman is learning more and more to familiarize himself with the symptoms of early tuberculosis and go to a doctor at a time when an early diagnosis can be made and when treatment can avail. Formerly, and not so many years ago, to be diagnosed tuberculous was to die; today it is to live. Tuberculosis should be diagnosed in the doctor's office and not in the home at the bedside, for under the latter circumstances the diagnosis is usually being made too late. The enlightened public is no longer thinking of tuberculosis only in the picture of the far-advanced case with extreme emaciation, high fever and wracking cough. They entertain suspicions and seek advice more and more as they are learning to appreciate the significance of such early symptoms as: a persistent tired feeling, gradual and unexplained loss of weight, a slight cough over several weeks duration, a tendency to persistent hoarseness and clearing of the throat, a slight afternoon and evening fever, blood-spitting, however slight in amount, persistent chest pains, night sweating, and vague digestive and nervous disturbances.

Let us hope that with the ever-increasing mobilization and strengthening of our forces, the battle against our foe will continue to be waged and to eventually come to a triumphant end.

The Fluoroscope in Diagnosis

A FLUOROSCOPIC examination is of value in that it enables the examining physician to detect the presence of pleuritic effusions without having to wait for the making of an X-ray film; it shows the movement of the diaphragm, and the expansion and movement of the lungs in forced inspiration, but it does not give us the detail in structure or show the minute changes in the lungs which the film does show, therefore, it cannot take the place of the film in diagnosis. R.B.H.

Tuberculous Bacillaemia

IN ADVANCING the frontiers of the knowledge of disease, conceptions will develop which only time and exhaustive investigation can prove correct or incorrect. It is obvious that the clinician, in his conduct of the case at hand, is guided by conceptions which must change as the frontiers of science are advanced. It would be rash to claim that medical science is so advanced that unknown frontiers no longer exist. Yet in this advance there will arise new conceptions; and old conceptions will be fortified by recent progress or be restated by the inception of a new technique where ample grounding may have been lacking. Even failures may be said to possess some merit, although when evaluated in the terms of labor may prove a temporary deterrent to progress.

Tuberculosis, like cancer, cannot yet be removed from the category of medical enigmas. The frontiers for intelligent investigation are still numerous in this disease. The average student reading the massive literature is confused by the *pros* and *cons* presented on every prevalent conception.

Pertinent to this is the recent exhaustive rediscussion of tuberculous bacillaemia or bacteremia. Periodic efforts to place tuberculosis in the category of bacillaemic diseases have been numerous, but two of them are outstanding. In 1908-9, Rosenberger electrified the tuberculosis world by finding tubercle bacilli in the blood of all of 125 cases and in at least one case where physical signs of the disease were lacking. The positive findings were subsequently proved to be due to faulty technique; and for the time being, tuberculous bacillaemia was relegated to the archives of forgotten conceptions, since microscopic examination of the blood proved faulty for such purposes. Then followed a confused discussion regarding the virulence of the bacilli and

BY
ARNOLD MINNIC, M.D.
Denver, Colorado

the inadequacy of animal inoculation for purposes of demonstration.

About this same time Much's granules occupied the arena, and filterable forms of the virus began to confuse the issue. Although Brem, in 1909, demonstrated the possibility of error due to the existence of harmless acid-fast bacilli in distilled water, not until recently was their universal presence acknowledged. Thus Eichbaum, in 1932, reported finding them in sixty water taps and tubs in different buildings in Frankfort. As early as 1912 Liebermeister found them in pepsin preparations, as well as trypsin; while Baetge found them in cedarwood oil.

Even guinea pig inoculation requires cautious interpretation because of possible errors. If acid-fast bacilli are used as criterion, precaution must be used to avoid errors from extraneous contamination sources. There is also the possibility of error in the presence of spontaneous tuberculosis, pseudo-tuberculosis, as well as diseases producing tubercle-like lesions in these animals. With the advent of better and newer culture methods, this means of study was resorted to.

The use of cultures for blood examination was not new, having been reported on a number of times from 1906 to 1930. As early as 1905, Loewenstein reported on obtaining cultures from blood of infected guinea pigs and rabbits. In 1930, however, Loewenstein seriously began to study the cultivation of tubercle bacilli from the blood and presented his acetic acid-sulphuric acid preliminary treatment, with culture on Loewenstein's Congo red, potato flour, asparagin, egg medium. His results were remarkable. An exact account of the results was rendered difficult for many reasons, since they were reported not only by Loewenstein himself but by his pupils in widely scattered places, and duplication in case reports was frequent. Positive findings were not

only obtained in an exceptionally high percentage of tuberculous cases but also in non-tuberculous cases.

A survey of the data accumulated with Loewenstein's method since 1930 in definite cases of tuberculosis are more conflicting. Loewenstein reports from 30 to 100 per cent results; the average figures by other workers varied from 0 to 20 per cent. The occurrence of positive results in non-tuberculous disease was very puzzling. Several workers who obtained a high proportion of results for postmortem heart blood on experimentally infected animals always completely failed to isolate genuine tubercle bacilli from the blood of living tuberculous patients. Workers who examined blood both by culture and by guinea pig inoculation are in almost complete disagreement with Loewenstein's findings.

The interpretation of "microscopic" positive culture advocated by Loewenstein and "macroscopic" positive culture has lead to disagreement. The microscopic method of examining a blood culture is open to the same objections as those for the direct microscopic examination of blood. Critical examination of the culture results obtained by workers subsequent to Loewenstein show that in a total of over 6,000 blood cultures made during life from tuberculous and non-tuberculous patients macroscopic growth of acid-fast bacilli, suspected of being tubercle bacilli, occurred on only seventy-two occasions. How many of these consisted of genuine tubercle bacilli it is impossible to say, since very few of them were adequately studied.

If these figures are accepted, however, as bona fide tubercle bacilli, there is no doubt that the percentage of positive findings for tubercle bacilli in the blood of evident tuberculous individuals is far below that accepted for proving a tuberculous bacillaemic or bacteraemic condition.

A few more recent results and conclusions may be pertinent to this discussion. In 1933, the British Medical Research Council reported on the examination of 282 tuberculous and 122 non-tuberculous

patients, the blood being cultivated by Loewenstein's technique. The positive results obtained were: three of the human type derived from patients with severe pulmonary tuberculosis; one human type from the heart blood in postmortem from a case of tuberculous meningitis; while at the same time seven macroscopic cultures of chromogenic saprophytic acid-fast bacilli were derived from four patients with pulmonary tuberculosis, two with non-pulmonary tuberculosis, and one with schizophrenia. The Research Council group did not contribute to the conception of a tuberculous bacillaemia in the usual case of tuberculosis.

In the same year, Corper, Damerow, and Cohn of the National Jewish Hospital at Denver, Colorado, report on the inability to find tubercle bacilli in the blood of 120 patients with advanced tuberculosis in spite of the fact that each blood specimen was submitted to four different methods of examination; namely, guinea pig inoculation, and three different culture methods. They point out that acetic acid as recommended by Loewenstein destroyed small numbers of human tubercle bacilli while saprophytic acid-fast bacilli would survive such treatment, thus vitiating the results obtained with this reagent. They conclude that human or bovine tuberculo-bacteraemias, in the sense that tubercle bacilli circulate in the blood for a fairly long time or that the bacilli multiply in the blood, are not borne out, although it is not intended to convey the impression that occasional embolic disseminations (showers) from disintegrating tuberculous foci do not occur or that there may not exist terminal periods in the course of the disease when numerous showers containing viable bacilli may make it possible to find them in the blood of man or experimental animals. However, such a condition of tubercle bacilli in the blood is far from being the common event, and embolic showers (embol-aemia), when they do occur in man, are rapidly removed from the circulation in the usual case of tuberculosis.

(Continued to page 21)

The Tuberculin Reaction

THE INTRADERMAL injection of Koch's Old Tuberculin introduced by Mantoux in 1907 as a diagnostic measure, is to-day the most satisfactory means of diagnosing tuberculous infection. Because of the controversy in the literature of the past, many physicians have been led to discredit its value in diagnosis and misconceptions abound concerning the significance of the reaction, the importance which may be attached to a positive or to a negative reaction, and the proportion of individuals reacting positively to the test.

What does the tuberculin reaction signify? The tuberculin reaction is essentially the visible indication of the reaction produced by injecting tuberculin into the body. A positive reaction, indicated by an area of redness and oedema at the site of inoculation, indicates that at some time previous to the test living tubercle bacilli entered the body and gave rise to tubercle formation usually in the lungs but occasionally in the kidneys, the bones and the lymphatics of the abdomen or of the neck.

What significance can be attached to the finding of a positive tuberculin reaction? Inasmuch as a positive tuberculin reaction indicates that the body has at some time become infected with tubercle bacilli, it was originally believed to indicate active tuberculosis. Later, many positive reactions were found in individuals who were never discovered to be tuberculous as we understand the term; so observers were inclined to attach little significance to the finding of a positive reaction. The literature of the past few years has indicated quite definitely that such an attitude is not only fallacious but also harmful, for many reactions have been ignored and the disease has progressed where otherwise it might have been checked. The finding of a positive tuberculin reaction is certainly an indication for the most painstaking and thorough physical

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and laboratory examination to find the original focus. Although it is generally taught that a positive reaction may be obtained even after dead acid-fast bacilli have been thoroughly and securely encapsulated by a calcified wall, observers have found that only too often acid-fast bacilli have been encapsulated without undergoing disintegration and even years subsequently have become sufficiently active to produce disease; in necropsy material lesions may be active continuously, although apparently clinically healed while apparently healed lesions may become active after years of presumed quiescence; hence the maxim, "Once infected, always infected."

For these reasons, some investigators feel that a positive tuberculin reaction means the presence of active, viable tubercle bacilli which may not be causing damage sufficient to be detected by our present means of diagnosis. Certainly no one is warranted in regarding lightly a positive reaction even in the absence of positive physical signs or symptoms. Whether or not a positive tuberculin reaction indicates immunity, it is certainly no asset to the individual; the common belief that a positive reaction indicates that the individual has become partially immunized to the tuberculosis and is less liable to develop tuberculosis is not supported by current studies. The bulk of the evidence tends to indicate that a positive reaction signifies infection with a tuberculosis which may or may not become clinically active.

What does a negative tuberculin reaction indicate? A negative reaction to the tuberculin test, properly applied, means that the individual is so fortunate as to have escaped infection with the tubercle bacillus. In exceptional instances, a negative tuberculin reaction may be associated with a tuberculous infection. Such instances include the loss of allergy of far advanced tuberculosis, apparent cure of tu-

berculosis, and exanthematous fevers, notably measles. Inasmuch as a positive reaction does not occur until 3—6 weeks after infection with the bacillus, a tuberculin reaction applied during the period of development of allergy may be negative. Such instances are decidedly in the minority; unless one of the above conditions exists, one should always regard a negative tuberculin reaction as indicating absence of infection with tuberculosis.

How many individuals have positive tuberculin reactions? With the introduction of tuberculin skin testing, it was only natural for the test to be applied first to hospital and dispensary patients. In Vienna, Pirquet found that about 92% of children at the age of 14 years reacted positively. Hamburger, working in a contagious disease service of the same city, found about 95% of children to have a positive reaction. These and similar statistics made so profound an impression that it is generally assumed that almost 100% of adults will react positively to tuberculin. These misconceptions have persisted despite the newer developments in the long fight against tuberculosis. Most of the subjects utilized for the studies were children of homes wherein the elementary principles of anti-tuberculosis measures were unknown. Many of them doubtless had tuberculosis unrecognized by the methods of diagnosis then employed. The incidence of tuberculosis has fallen markedly in the past quarter-century as morbidity and mortality charts have been invoked to demonstrate; therefore, it follows that there should be fewer individuals with positive tuberculin reactions than in 1907. Despite this, there is still a common impression that a positive tuberculin reaction should be disregarded because nearly everyone "has tuberculosis at some time in his life."

Recent investigations most certainly do not confirm such impressions. It is true that the incidence of tuberculous infection increases with age, but by no means is the anticipated incidence of 95—100% attained. In Honolulu, of 1,437 school children between the ages of 11—18 years,

75% reacted positively; Dickey and Seitz found that of their group of San Francisco children of 1—14 years of age, only 23.5% reacted positively. In a recent Texas survey, 20% of a similar age group reacted positively; in certain sections of the Middle West, the incidence has been lower than 1%; of freshmen entering the University of Pennsylvania, 49% were positive; 30% of University of Wisconsin freshmen were positive; only 20% of 550 high school students of Minnesota were positive reactors; of 1,000 children between the ages of six months and sixteen years entering the Mayo Clinic from all parts of the United States, only 16.5% were positive. In this connection it is well to recall the warning of Johnston and Chadwick that one cannot study a few hundred cases in a given city and generalize accordingly; it is necessary to study large groups in order to avoid individual differences. It has been found that children of various parts of the country and even of different sections of the same city have varying rates of incidence of infection. One of the largest single surveys of this country, that of the Massachusetts ten year program, has included about 100,000 children in an incomplete tabulation; of these, only 28.5% reacted positively.

These variations are not due to differences in technic or to human error; they are of far greater significance. They reveal that as a result of the perfectly tremendous amount of human endeavor expended in the past several decades of anti-tuberculosis campaigns, the incidence of infection with tuberculosis fell as the rates of morbidity and mortality dropped. It is significant that in most of the communities where such comparison was afforded, the lowered rates of infection were accompanied by lower mortality rates. The varying rates of incidence of positive tuberculin reactions within this country merely indicate that progress in this direction has not been equal all over, but that certain sections have made more rapid strides than others. In general, rural communities appear to have less tuber-

culous infection that do urban centers. A study of interest is that of Ustvedt of Norway who tested the town's children and found that 24% of them reacted positively, whereas Arnfinnsen had found 38% positive when he conducted his investigations during 1914; thus there had been recorded a decreased incidence of 14% in 20 years. It is also of interest that he could conclude from his calculations that the age at which the first infection was acquired had been deferred from childhood to adolescence. Such conclusions are corroborated by the finding that in this country, at least 50% of students entering some Universities have never experienced tuberculous infection.

What proportion of reactors have active or demonstrable tuberculosis? The answer to this question must necessarily be inadequate because a positive reaction was hitherto disregarded so often that no adequate follow-up was instituted. Where such studies were begun, it was found that from 3—59% of the positive reactors had evidences of the childhood disease and from 1—6% had roentgenologic evidences of the adult forms of lesions. These computations, it must be understood, are for groups of individuals none of whom considered himself ill in any way when the investigations were begun and none of whom gave a history of tuberculous disease in the past. If these figures seem unimpressive, it should be noted that the prevailing methods of diagnosis of tuberculosis leave very much to be desired. Most studies were concluded with a single roentgen examination of the chest; a few studies included repeated chest examinations in the course of which unsuspected lesions of tuberculosis were found on the roentgen film. Most observers feel that failure to demonstrate a focus of tuberculosis in an individual with a positive tuberculin reaction is unsatisfactory. It is known that an active focus may exist and be too small to be visualized or be concealed behind the shadow of the heart. Somewhat encouraging is the report that a few such inaccessible lesions have been visualized by a special radiographic tech-

nic. This is, however, exceedingly costly and time-consuming and is beyond the reach of the average investigator. Possibly if a complete roentgenologic examination of the lymphatic and osseous systems were available, it might be possible to discover yet other foci of primary tuberculosis in individuals who are at present dismissed as having no tuberculosis because none was discovered in a roentgenogram of the chest.

These observations apply to the first infection type or the so-called childhood disease which has always occurred by the time that the tuberculin reaction has become positive. Although 80—90% of these individuals are never known to succumb to tuberculosis, it should be realized that very few of them have the benefit of repeated chest examinations and may appear to be in fair or even good health while tuberculous lesions of the lungs are progressing. Robertson's necropsy findings of active tuberculosis in individuals apparently clinically cured and of histologically active lesions in lungs in which tuberculosis was presumed to have been quiescent are only confirmatory of the observations of some investigators who have found active, viable bacilli in calcified areas with all the clinical, roentgenological and gross pathological appearances of healed lesions. From all the foregoing, it may be inferred that when no active tuberculosis can be found in individuals with positive tuberculin reactions, some cases of active tuberculosis are being ignored.

What are some practical applications of the test? Because the positive reaction means infection and because the negative reaction may generally be interpreted as absence of infection, the test may well be utilized to determining which members of a group of individuals have become infected with tuberculosis. One of the ideals to be attained is the application of the test at regular intervals throughout the life of an individual from infancy onward; in this way, one could actually determine the time of infection with tuberculosis and would not only treat the earliest manifestations of tuberculosis, but could also

study the actual development of the disease in all its aspects. That some startling data would be accumulated in this fashion is evident from the findings of those who have investigated the reaction from infancy onward and have found that, contrary to general belief, the positive tuberculin reaction in infancy does not portend a grave prognosis per se; many such infants live to swell the ranks of those who have a positive reaction and are never known to develop active tuberculosis. Certainly it would open to research vast new fields for investigating the value of any test for activity of tuberculosis or of any therapeutic agent which would halt the progress of the disease before advanced lesions were found. That this ideal is yet very far from attainment must be admitted now; still the idea is so intriguing that one can only hope that some day it will be realized. Another utilization of the test is that of determining the damage rendered by the necessary exposure to tuberculosis which is a portion of the routine of physicians, nurses and medical students. From various parts of the country are heard expressions of dissatisfaction concerning the present morbidity and mortality rate of tuberculosis for medical personnel. It would be of great value to apply the test to all the medical and nursing staffs of a given institution and if positive reactions were found among individuals who had negative reactions before such exposure, such individuals could be examined for evidences of tuberculosis. If a considerable number of such people acquire tuberculous infections in this manner, it would be advisable for this institution to consider means of checking the spread of the disease.

Is the tuberculin reaction safe? One frequently encounters the fear that the general application of the tuberculin test is apt to be followed by reactivation of a tuberculosis previously quiescent. Such fears are not well grounded for the introduction of tuberculin in any amounts into the body of an individual who has never been infected with tubercle bacilli cannot be followed by any ill effects, while the

introduction of tuberculin within the skin of even a tuberculous patient is not attended by any serious mishaps. The ill effects reported are those of the subcutaneous and not the intracutaneous application. The recent application of the tuberculoprotein, the so-called TPT of Florence Seibert or the commercially available PPT renders skin testing more practicable, for this can be standardized and is effective in amounts small enough not to cause objectionable local symptoms.

Conclusions

1. The intradermal tuberculin reaction is of great value in determining the presence or the absence of tuberculous infection and should be a part of every general physical examination.
2. A positive tuberculin reaction should not be disregarded even in the absence of all signs and symptoms because it indicates that the body has been infected with tuberculosis.
3. Any individual with a positive tuberculin reaction should have the benefit of periodic search for the primary focus of tuberculosis.
4. The more general application of the tuberculin skin reaction in the earlier age group will be followed by an earlier diagnosis of tuberculosis in a number of instances sufficiently great to merit the trouble and expense required.

HANSEN, OLGA S. and MALAY, HENRY W.
The Heart After Phrenic Nerve Interruption.
American Review of Tuberculosis. Vol. 30,
No. 5.

The authors summarize a study of one hundred cases of unilateral diaphragmatic paralysis by phrenicectomy. The studies were made by the electrocardiograph and x-ray observations before and after the operations. The observations were continued until the full effect from the paralysis of the diaphragm had been obtained.

Changes noted:

- (1) P waves changed only six times.
- (2) A change in direction and amplitude of the Q. R. S. waves in sixty five.
- (3) T wave changes appeared in twenty three cases.
- (4) The heart position was displaced from its free operative position in sixty nine cases.
- (5) No evidence of heart damage appeared.

A Simple Method of Obtaining Skiagrams In Artificial Pneumothorax Work*

ALL ARTIFICIAL pneumothorax work should be controlled by repeated examinations of the patient under the X-rays,

and, if possible, records should be kept of the condition of the chest on certain dates. The usual method of keeping such records is to take an X-ray photograph every two or three months. This method involves considerable expense and time, particularly if prints of the negative are desired to complete the clinical notes of the patient. When a large number of patients are receiving treatment, it becomes necessary to engage an assistant to do the photographic work; thus the expense of obtaining the necessary information is still further increased.

In order to economize both time and money, the following method was devised at the Warwickshire King Edward VII Memorial Sanatorium, and is proving most successful. The apparatus required, in addition to the usual fittings to an X-ray outfit, is extremely simple. It consists of a clean, smooth gelatine film, made by washing off the photographic film of an old 15-inch by 12-inch negative, a roll of adhesive plaster, soft black and red grease pencils, black and red pastels, xylol, and sheets of typing paper the size of the gelatine film. The method of obtaining a record of the condition of the patient's chest is again simple, and requires very little practice. A good screen is obtained with about 1 to 3 milliamperes. The gelatine film is fixed over the center of the fluorescent screen by three strips of adhesive plaster. The patient is placed in the usual position, and the fluorescent screen pressed firmly, but gently, on to the chest. The distance of the screen from the tube is noted and marked with the grease pencil on a corner of the gelatine film. The fluorescent

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screen is then fixed, and the current switched on.

The outline of the thorax, with the clavicles, the diaphragm and

the heart, are quickly sketched on to the gelatine film with the grease pencil. Then any definite lines made by the shadow of collapsed lung, fluid, or calcareous masses are marked. All these will be seen quite plainly through the film. The lower edge of the film is then released and gently raised, and the finer variations of the shadows on the fluorescent screen are observed. The film is then replaced, and as many as are thought necessary of these shadows are recorded. The marking of these finer details requires a little practice. The current is now switched off, and the film is removed. If necessary, the procedure can be repeated for the back view with another clean gelatine film on the fluorescent screen.

In practice it is found that the gelatine film-tracing can be easily made in one minute, so that there is no danger of the patient being injured by the X-rays. The film is taken and placed in a viewing box, with a sheet of typing paper of the same size over it. The markings of the grease pencil are then traced on the paper with pastel and shaded with a shading stump, the result being a pastel tracing of the important shadows seen on the fluorescent screen. The paper is then removed from the viewing box, pinned on to a board, and the pastel fixed by pouring boiling milk evenly over it; it should then be hung up, and allowed to dry thoroughly; this prevents smearing, and makes the drawing permanent. This record, which we call a skiagram, is then named, dated, and filed. The films are carefully cleaned with xylol on cotton-wool swabs, and are ready for use again.

(Continued to page 22)

*Reprint from British Journal of Tuberculosis.

The Sanatorium

BEFORE THE discovery of the tubercle bacillus, the treatment of tuberculosis did little in arresting the disease. In 1840, George Bodington, an Englishman, advised outdoor living as a means of regaining health, and later established the first sanatorium. His ideas were not gratefully accepted and he was denounced and persecuted and forced to abandon his institution.

In 1859, Dettweiler established a sanatorium in Germany, and this institution lived through the ridicule of the times.

With Koch's discovery of the bacillus in 1882, a new impetus was given the tuberculosis problem.

In 1884, Dr. Trudeau established his world-renowned sanatorium in Saranac Lake, and this was the beginning of the great sanatorium movement throughout the world. Today every country within the circle of civilization boasts institutions, both private and public, for the care of the tuberculous.

Considering the enthusiasm of the sanatorium movement, it is astonishing that only a small percentage of tuberculous individuals could avail themselves of sanatorium treatment if they so desired. The number of beds is far from adequate to care for the large army of people afflicted with tuberculosis. Still, it is the opinion of most specialists that, for a time at least, patients should be placed in an institution. If finances do not permit a residence until cured, a few months will prove an excellent education. The patient leaves with a knowledge of what to do and what not to do, which will prove invaluable when he attempts to follow out the cure at home.

So much is being written today relative to compression therapy making a stay in a sanatorium unnecessary, that a word of warning seems in order. Patients' lungs are compressed by artificial pneumothorax and in a month's time they are

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returned to work, being given to understand that the disease is arrested.

Tuberculosis is not cured in a day, and even though a lung is put at rest, time only and proper living can effect a cure.

In my opinion, all cases on whom compression treatment is considered should be in a well-conducted sanatorium and kept there on a comparative rest regime for many months. This I realize cannot be done in all cases. We find many without means on whom we do a collapse to make it possible for them to work and still get by. If possible, these patients should enter one of the philanthropic institutions—state, municipal or county—until such time that danger from resuming their occupation is passed. The indiscriminate use of compression therapy in the home should be discouraged where it is possible to place the patient in an institution.

The earlier the diagnosis is made and the earlier the patient reaches the sanatorium, the better the chances of effecting a cure. Too many people fight the idea of institutions, thinking contact with sick people tends to discourage. This is the opposite of the truth. Properly conducted sanatoria provide a pleasant atmosphere, and the average person is far happier in these surroundings than when treated at home.

When one considers the army of far-advanced cases of tuberculosis throughout the country, one realizes that this stage of the disease has been reached through poor advice or through lack of taking good advice.

If all disease could be diagnosed early and all patients given sanatorium care, there would be little reason to fear the outcome. In properly-conducted institutions, ninety percent would make perfect recoveries, and the advanced consumptive would be but a memory.

SUPERVISED GRADUATED EXERCISE IN THE TREATMENT OF PULMONARY TUBERCULOSIS

(Continued from page 8)

eral feeling, appetite, weight, nervousness, returned inclination to cough, everything must be watched and assessed. If any symptoms return, all exercise should cease and the patient return to bed rest. After the symptoms disappear and have been absent for a week, exercise may be returned where it was discontinued and not in the way of its beginning.

If everything goes well, this weekly increase in exercise should be continued until the patient is employed in walking, or its equal, for five or six hours daily. By this time the patient should be well enough to go home and return to his work. For a month or two it will be much safer to work in the forenoons only—resting in the meantime, three hours in bed after the noon meal. Early bed hours at night should be followed.

After one has any appreciable tuberculous involvement, the road back to normal is a long and tedious one. But it is the only safe course. It is on this road where so many patients lose their way and wander into dangerous thickets from which extrication may be impossible.

Every one who has had tuberculosis should know that full capacity and restoration are rarely obtained under two years—often longer. The patient must learn to treat his body like a careful business man treats his bank account—store it up rather than use it up—conserve it and not dissipate it.

This plan is trying but trustworthy. Good health is the foundation of usefulness and happiness. It is worth anything we may have to pay for it. Without it, life is a burden and the victim a liability.

HOW NOT TO TREAT TUBERCULOSIS . . . (Continued from page 10)

a frequent cause of hemoptysis. An overdose of sun is as dangerous as an overdose of tuberculin or arsenic.

Hemorrhage in pulmonary tuberculosis is of rather frequent occurrence and is often frightening to the patient and the doctor. Morphine has been and unfortunately still is, with many doctors, a favorite drug in the handling of this complication. Morphine is a drug that should never be used in pulmonary hemorrhage, and its use cannot be too strongly condemned. Its use simply predisposes to hypostatic pneumonia, and then we have the added complication of a tuberculous pneumonia. In massive hemorrhage death occurs so quickly that no treatment is of any avail. If the patient is alive when the doctor arrives, the odds are all against death occurring from that hemorrhage, and the mere presence of the physician, and his calmness and assurance to the patient that

he is not going to die, is of tremendous importance to that patient. The two best procedures in the prevention and control of pulmonary hemorrhages are induced pneumothorax and blood transfusion. Absolute flat bed rest is of course essential and large doses of calcium and some of the various blood coagulants, are probably of help, but are certainly no panacea.

These remarks have had to do with how *not* to treat pulmonary tuberculosis. For the treatment suffice it to say at this time, this consists of accurate and early diagnosis; having the patient under control; sufficient knowledge of tuberculosis and the various methods of treatment, to decide whether bed rest, supportive regime under a sensible well-balanced diet, close supervision, etc., are sufficient, or whether pneumothorax or thoracic surgery is indicated, and, if so, when indicated.

TUBERCULOUS BACILLAEMIA . . . (Continued from page 14)

Likewise, Saenz, in 1934, points to the fallacy in using microscopic colonies as a criterion since these bacilli may be found in rubber tubing or in various solutions that have been employed in preparing the

culture medium or stains. Only in one and two-tenths per cent of 500 cases of various forms of tuberculosis did he obtain macroscopic growth, and of the ten positives three proved to be saprophytic

acid-fast bacilli. Cases of rheumatism and samples of cerebro-spinal fluids were all negative.

Thus, it would appear best at present

to view tuberculosis in the usual case not as a condition of bacillaemia but rather as a disease of occasional embolic complication.

A SIMPLE METHOD OF OBTAINING SKIAGRAMS IN ARTIFICIAL PNEUMOTHORAX WORK

(Continued from page 19)

When information of the condition of the patient's chest is again required, the skiagram is placed in the view box, with a clean gelatine film over it. The main outlines are marked on the film with red grease pencil, paying particular attention to the position of the edge of the lung, or the surface of fluid, or any other feature that is of interest. The patient is placed in position for screening, and the film with the red tracing is fixed to the fluorescent screen, care being taken that the latter is the same distance from the tube as on the previous occasion.

The film is then adjusted so that the clavicles and outlines of the chest are superimposed on those of the patient under examination; this requires care. All variations of the position of organs are now marked with black grease pencil, and the process of obtaining a tracing is repeated, either on the original skiagram,

using red pastel, or on a new piece of typing paper. The tracing is then fixed in milk, named, and dated, and so a second skiagram is produced. By this method we obtain a permanent series of pictures of a patient's chest, showing very clearly and with considerable accuracy the changes which have occurred in any particular condition under observation.

The method is recommended because it is simple, rapid, and economical, and although it probably will not be of use to the expert radiographer, we think it may be of use to many engaged in artificial pneumothorax work who require a record to enable them to compare screen examinations without resorting to photography, which is a somewhat costly and lengthy process, and, unless done by a specialist, may give results which do not give the required information, and therefore does not justify the expense.

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ABSTRACTS



This department is devoted to abstracts of articles carefully and judiciously selected by the Editorial Staff.

PEDRINONI, G.: Rilievi clinici su un caso di litiiasi polmonare. Riv. di Patol. e Clin. della Tubercolosi, 258.

Pulmonary lithiasis is a rare condition. Although occasionally small granules may be found in the sputum of tuberculous patients, the presence of a real calculus with clinical symptoms is exceptional. The subject is of practical interest for two reasons. First, because the occurrence of symptoms due to a calculus may be misinterpreted and attributed to other factors, and secondly, on account of the prognostic and therapeutical importance of pulmonary lithiasis. With very rare exceptions the calcareous concretion represents an extinct or latent tuberculous focus. The color of the calculus is greyish-white, the surface porous and spongy, and the size varies from that of a grain of rice to that of a hazel-nut. Its chemical composition varies, but carbonate or phosphate of lime always predominates, and is accompanied by traces of phosphate and carbonate of magnesia and small quantities of organic substances such as fat and cholesterin. The symptoms in almost all the cases on record are retrosternal pain and a sense of suffocation. The pain is due to irritation of the bronchial mucosa caused by the presence of the concretion, and the sense of suffocation is partly of mechanical origin and partly a reflex phenomenon as in biliary and renal lithiasis.

Pedrinoni records a personal case in a woman, aged 38, the subject of chronic pulmonary tuberculosis, who during a fit of coughing expectorated a large calculus, consisting mainly of calcium phosphate and carbonate with traces of magnesium carbonate and phosphate, fat and cholesterin. The symptoms of cough, pain and dyspnoea were considerably relieved, but

death took place some months later, and evidence of advanced pulmonary and laryngeal tuberculosis was found at the necropsy.

MOORMAN, Lewis J.: Advanced Pulmonary Tuberculosis. Annals of Int. Med. Vol. 5, No. 8, p. 1022.

The dominant theme of practically all discussions dealing with clinical tuberculosis has been early diagnosis and early treatment. While the significance of this theme is perfectly obvious, there still seems to be a general lack of interest in tuberculosis. This may be accounted for in part by the fact that, until recently, we have been unable to offer any constructive variation in a program which often proved inadequate. It is not surprising that many members of the profession not particularly intrigued by the interesting game of physical diagnosis and not committed to the rather difficult task of phthisiotherapy, should manifest a certain amount of indifference.

Since tuberculosis continues to be one of the prime factors in morbidity, and is responsible for *one-seventh of the world's mortality*, it deserves the serious interest of the medical profession.

White it is necessary to maintain our emphasis upon early diagnosis and early treatment, it is most gratifying to be able to recount the fact that recent advances in the treatment of pulmonary tuberculosis offer a new hope to those suffering from the more advanced conditions which might otherwise be considered hopeless.

In this lecture, Dr. Moorman presents three cases with advanced tuberculous lesions and points out the possibilities of treatment such as pneumothorax, unilateral or bi-lateral, the cauterization of pleural adhesions, the various operations on the phrenic nerve, and thoracoplasty.



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SMITH, ADELAIDE ROSS: Silicosis Among Rock Drillers, Blasters and Excavators in New York City. *Jour. of Indust. Hygiene.*

As an occupational disease, silicosis has a long history, but it is only comparatively recently, that is to say, within the past twenty-five years, that it has received attention. In the United States the first studies of silicosis were made among the zinc miners of Missouri by Lanza and Childs, in 1917. The present study was made of 208 rock drillers, blasters and excavators in New York City for the purpose of determining the incidence of silicosis among them. Silicosis was found to be present in 118, or in 57 per cent of the men examined. Twenty-three per cent of the men examined showed radiographic evidence of antepimary silicosis; 19 per cent of first stage silicosis; 7 per cent of second stage silicosis; and 8 per cent of third stage silicosis. Blasters, rock drillers and excavators were affected by the disease in frequency and in severity in the order named. Second and third stage silicosis occurred four times as frequently among those who had done under-ground work, as among those who had done only open excavating. The incidence of silicosis among men who had worked only in New York City was slightly higher than among those who had worked elsewhere as well. Ante-primary silicosis was found to be present in conspicuous proportions after five years' exposure to rock dust; first stage silicosis after ten years' exposure; and second and third stage silicosis after twenty years' exposure. Second and third stage silicosis was associated to a noticeable degree with a past history of pleurisy and pneumonia. Dyspnea and expectoration were the only symptoms found to be significantly associated with the disease in this study. Lung signs were in general inclusive, although rales and diminished resonance and breath sounds were found most frequently among those showing silicosis in the second and third stages. Tuberculous lesions revealed by roentgen examination, including both those considered active, and those believed to be probably healed, occurred in nineteen cases,

or 9 per cent of the total number. The incidence of all tuberculous lesions was approximately three times as high in the group of cases showing second and third stage silicosis as in any of the other groups. The author concludes that silicosis constitutes a serious health hazard to rock drillers, blasters, and excavators in New York City.

LUDOVICO, P. Relazioni fra resistenza individuale e formula ematica nella tubercolosi polmonare. *Riv. di Patol. e Clin. della Tubercolosi*, 2, 17.

Ludovico made a study of the blood-picture in 24 cases of pulmonary tuberculosis, of which 16 showed a tendency to recovery and 8 ended fatally. In almost all the cases there was a slight degree of anemia which improved in the cases which tended to recover and remained almost stationary in those which took a downward course.

In almost all cases the color index was above unity. In all cases there was a leucocytosis which tended to diminish in cases which improved, but disappeared in those which grew worse. All the cases showed a neutrophil polymorphonucleosis which underwent a pronounced increase in cases which grew worse. Eosinophil polymorphonuclears which were diminished in incipient cases increased in number until they almost reached normal in cases which improved, but disappeared in cases which grew worse. Large mononuclears showed a slight increase in cases which improved, but in the others they were at first normal and then underwent a diminution. Lymphocytes on the other hand were almost normal in cases which improved, but increased at first and later became much reduced in number in cases which became worse.

ROSA, F. La diazoreazione di Ehrlich e la reazione di Weisz nelle urine dei tubercolosi. *Gior. med. dell. osp. civ. di Venezia*, 1, 215.

As the result of testing the diazo reaction in 300 cases and the Weisz reaction in 330 cases of tuberculosis Rosa comes to the following conclusions: (1) the diazo and Weisz reactions cannot be of any assistance in the diagnosis of pulmonary tu-



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berculosis, because they are sometimes negative in advanced stages of the disease, or on the other hand may be positive in many other infections.

(2) When the reactions are negative they do not possess any prognostic value, especially if they are performed only once; on the other hand, if they are positive and remain so they undoubtedly herald an unfavorable issue. The diazo reaction may become positive as the tuberculous process becomes aggravated or becomes negative as general improvement takes place.

(3) In tuberculosis accompanied by several renal complications the prognostic criteria of these two reactions become modified by the albuminuria.

(4) As regards the comparative prognostic value of the two reactions, a positive diazo reaction is a much more unfavorable sign than a positive Weisz reaction.

(5) Whereas the diazo reaction does not appear to be much affected by treatment, the Weisz reaction is always positive in patients treated with cryogenine and should therefore be regarded as of much less significance than the diazo reaction.

BARGHOFF, ROBT. S.: Intestinal Tuberculosis. *Annals of Int. Medicine*, Vol. 2, No. 9, p. 59.

Intestinal tuberculosis occurs in probably 50% of all cases of far advanced pulmonary tuberculosis. The pathology consists of the tubercle which in this case is prone to early ulceration. The bacilli may, however, pass through the wall of the gut without leaving a trace and involve the mesenteric lymph nodes. The regions most frequently involved are the ileum, cecum, and ascending colon—the so-called “sluggish areas”. These areas are also the most absorptive regions of the gut which may explain why the bacilli are more prone to gain admittance.

Symptoms are often amazingly meager especially in the incipency. Some of the most constant are: 1. Alternating constipation and diarrhea. 2. Abdominal pain which may be colicky or diffuse and

general, with tenderness over the right lower quadrant. 3. Stomach symptoms such as absolute loss of appetite, aversion to food, and nausea. Vomiting is infrequent. 4. The resulting emaciation and cachexia. 5. Nocturnal diarrhea is probably more constant than in any other disease. 6. The temperature is not specific except in periods of severe ulceration when it is likely to be extremely high.

Perforation of the bowel is rare because of the thickening of the intestinal wall by granulation tissue. Stenosis of the intestine with obstruction is not infrequent. Involvement of the mesenteric nodes and of the peritoneum is frequent.

Treatment consists of general and local rest. The patient should have absolute bed rest 24 hours daily. Local rest or retarded peristalsis is obtained with a bland, non-irritating diet, hot compresses to the abdomen, occasionally hot bland or starch enemas, and by drugs such as atropine sulphate (1-200 grain), bismuth subnitrate in 30 grain doses, calcium carbonate and phosphate in doses of each 30 grains, and in the advanced cases opiates in the form of deodorized tincture of opium. X-ray and heliotherapy are recommended. Ultra-violet ray is preferred by the writer.

ANDERSON, ALAN R.: Electrocardiographic Studies in Artificial Pneumothorax and Thoracoplasty. *Am. Rev. Tuberc.* 20: 728.

Electrocardiograms made on 100 consecutive admissions to a tuberculosis sanatorium have shown very little deviation from the normal. Electrocardiographic studies were made on 50 patients with artificial pneumothorax and 8 cases with thoracoplasty. Neither the degree of pulmonary collapse maintained nor the duration of the collapse therapy had any definite relationship to the form of the electrocardiogram. Axis deviation of the heart occurred with right pneumothorax in 36 per cent of the cases.

These studies would not indicate that any of the patients were afflicted with a degeneration of the cardiac muscle. The clinical data would appear to bear out this contention.

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Q. Is there a limit to the size of a cavity that will heal spontaneously?

A. Yes, such a cavity would probably be limited to a c.m. in diameter.

Q. Is there a tendency in a case with excessive cough and expectoration of aspirating some of the material into a remote portion of the lung?

A. Yes, if a patient has a marked fluidity of the discharged material, a rapidity of the discharge, and an intensity of respiratory movement, etc., would tend toward the aspiration of infectious material into the remote portion of the lung with establishment of distant foci of infection.

Q. Is the epidemiology of tuberculosis a greater problem in the city than in the country?

A. No. It is a greater problem in the rural districts.

Q. How can the rural problem of tuberculosis be improved?

A. By a thorough and complete survey of the open case and by the skin test in children, and by a survey of the milk supply. However, tuberculin testing provides the first means of epidemiologic diagnosis.

Q. Should the physician still urge sanatorium care in every case?

A. Yes. If, however, the patient desires to remain at home, or for financial reasons cannot enter a sanatorium, the patient should be instructed that after a minimal period of heroic treatment, progress has been unsatisfactory, the patient should be again urged to accept care in a sanatorium.

Q. Does the presence of cough always indicate the presence of pulmonary disease?

A. No, not always. Cough may be caused by inhalation of irritating gases or cold air, or excessive secretion. It must be remembered that the cough reflex most often originates, in the majority of cases, in extrapulmonary situations, such as, the larynx, the pharynx and nasal pharynx, the mediastinal glands, the stomach or ear.

Q. Is acute bronchitis essentially a primary disease?

A. No. It is quite often a secondary manifestation or a complication of other primary conditions.

Q. Has the number of tubercle bacilli in the sputum any bearing on the intensity of the bronchial ulceration?

A. The larger the number possibly the greater or more acute the ulceration, but enormous masses may occur in favorable cases.

Q. Is the fluoroscope of great value in revealing slight lesions in the lungs?

A. The fluoroscope is valuable for the study of movement both normal and pathological and as an aid in the treatment of artificial pneumothorax. It most always fails to reveal slight lesions which are plainly evident upon the roentgenogram.

Q. A left thoracoplasty done five years ago has done very well with the exception of severe pain over the scar area. About three months ago this painful site began to swell. I opened a deep-seated abscess which drained about four ounces of pus at the time, at the

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EDITORIAL
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same time air came through with the pus. About two inches above the abscess, on coughing, the skin bulges and through a pin-point opening the air passes on coughing. I would like to know how often bronchial fistula follows thoracoplasty, also what is the theory of causation, also what is the proper treatment advised?

D. K.

A. It would seem valuable information to ascertain whether or not the sinuses communicate with the bronchi. This could be ascertained by the injection of lipiodol or other lidinized oil into the sinuses. A roentgenogram following the injection of the iodinated oil should give pertinent information. The patient would, of course, cough up the oil if the sinuses communicate with a bronchus. It is conceivable that the sinuses communicate with a localized empyema cavity only. In either event unroofing of the old abscessed cavity would be a procedure well worth consideration.

Q. I have asked for and received several definitions of allergy. I would like your definition to compare with the varying (not various) ones I have.

A. Dorland's definition of allergy is: "A condition of unusual or exaggerated specific susceptibility to a substance which is harmless in similar amounts for the majority of members of the same species." The inference in this definition is that specific susceptibility to a given substance is not allergy until it is in the exaggerated or unusual state. Vaughn in his text book "Allergy" does not attempt a concrete definition of allergy, but explains that the sensitization of cells to protein matter is that phenomenon created by the different amino acids of the protein substance contacting the living cells. The cell attempts to digest or break up the amino acid compound into such component parts that it may absorb the amino acids of its election. To accomplish this the cell throws out a ferment capable of splitting up the amino acids the end result being the amino acids that are nutritious and amino acids that are poisonous. Those poisonous acids that are repellent to the cell are the ones that produce the sensitization reaction.

If I may be permitted to add to the variety of answers that have gone to the writer of the above questionaire, I would say that allergy is a physiological reaction of the living cell to a given substance, to date believed to be only protein substance. What we know clinically as the allergic phenomenon is the amplification of this physiologic reaction or supersensitive state of the cell. Whether the supersensitive state of the cell is an effort on the part of the cell to repel the specific protein compound or whether it is, as Vaughn points out, the reaction against certain poisonous amino acids split off of the original protein body, I cannot say.

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